A REVISION OF THE NEW ZEALAND ATHORACOPHORIDÆ.

By Henry Suter.

Read 9th April, 1897.

During the last few years I have tried to get specimens of our native slugs from as many localities as possible, and the material thus brought together, comprising all the species known, enables me to attempt this revision. Since publishing the "Reference List of the Land and Fresh-water Mollusca of New Zealand,"[1] in 1893, Mr. W. E. Collinge has described *Janella maculata*[2] from specimens I sent him, collected in the Forty Mile Bush, North Island. As will be shown later on, I do not consider Mr. Collinge's species new; however, its creation has demonstrated that we have more distinct species than I was willing to admit in the "Reference List."

Then Cockerell's *Neojanella dubia*[3] required investigation, as well as Simroth's *Athoracophorus marmoratus*. The former I considered to be synonymous with *A. bitentaculatus*, Quoy & Gaim., the latter with *A. marmoreus*, Hutton, but in both cases I was wrong. Specimens are now in my possession, and on examining and dissecting them I convinced myself that my former conclusions were erroneous.

A new species, *A. Simrothi*, which exteriorly is very distinct from all the other species, has been described in these Proceedings (ante, p. 34), and with another interesting new species brings up the number of known species to eight, three only having been admitted in the "Reference List."

Mr. Collinge was no doubt quite right when, in concluding his paper (t.c., p. 530), he expressed the opinion that the whole family Janellidæ required revision, and that a series of coloured drawings taken from living specimens should be provided. Unfortunately my means are too limited to undertake the latter task; while with regard to the present revision of the New Zealand Athoracophoridæ I am fully aware that it is very far from being exhaustive, leaving many questions concerning the members of this very interesting family untouched, especially their more detailed anatomy.

The very peculiar and interesting structure of the eyes, as demonstrated by Dr. Simroth in *A. marmoratus*,[4] on which he based his

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[1] Proc. Linn. Soc. New South Wales, ser. II, vol. vii, pp. 613–665.
[2] Proc. Zool. Soc., 1894, p. 527.
[3] Proc. Zool. Soc., 1891, p. 217.
[4] Nova Acta Acad. Cæs. Leop. Carol., Bd. liv, p. 76, pl. iv, figs. 19, 20.

division of the Stylommatophora (t.c., p. 85) into Pleurommatophora (true land-pulmonata) and Mesommatophora (Athoracophoridæ), seems not to be generally known, though highly important.

One of our species, *A. marmoratus*, Mts., approaches the genus *Aneitea* in the situation of the anus close to the mantle-area. There is no diverticulum of the crop in *Athoracophorus*, such as occurs in *Aneitea Graeffei*, according to Keferstein and Bergh, the crop having been taken for the stomach. A renal duct is always present in *Athoracophorus*, but it seems to be wanting in *Aneitea*.

Key to Species.

A. Mantle-area not defined.

a. Colour dirty yellow, with darker spots and dashes.

b. Body semi-cylindrical, long and narrow, dorsal grooves slight, penis *narrowed abruptly* in the middle, thence convolute and thin. *dubius.*

bb. Back much more flattened, dorsal grooves more distinct, penis *narrowing gradually* towards its distal end. *bitentaculatus.*

aa. Colour dirty yellow, without spots. Penis short, no convoluted distal portion. *antipodarum.*

AA. Mantle-area well defined.

a. Anal opening near the foot margin, below the pulmonary orifice.

b. Back more or less strongly granulate and papillate.

c. A few slightly larger papillæ in each lateral area on the back, which are not very conspicuous. Free oviduct not dilated. *papillatus.*

cc. One, or usually two, large, conspicuous papillæ of lighter colour in each lateral area on the back, near the median dorsal groove. Free oviduct dilated. *Dendyi.*

ccc. The whole back covered with large, oval papillæ, giving it a grape-like appearance. *Simrothi.*

bb. Back smooth, or faintly granulate, colour dark, marbled. *marmoreus.*

aa. Anal opening outside the right anterior angle of mantle-area. Largest species. *marmoratus.*

Fam. ATHORACOPHORIDÆ,

Including the genera *Athoracophorus*, Gould; *Aneitea*, Gray; ? *Aneitella*, Cockerell.

Genus ATHORACOPHORUS, Gould.

Gould, U.S. Explor. Exped. Moll., vol. xii (1852), p. 1.

(*Janella*, Gray, 1850, *non* Grateloup, 1838.)

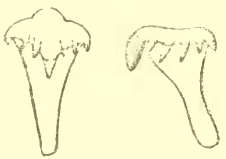
Sect. I. ATHORACOPHORUS, s.s.

1. ATHORACOPHORUS BITENTACULATUS (Quoy & Gaimard).

Limax bitentaculatus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. ii (1832), p. 149; Atlas, Moll. pl. xiii, figs. 1–3.
Janella maculata, Collinge, Proc. Zool. Soc., 1894, p. 527.

For all other references, see Journ. de Conch., vol xli (1893), p. 234.

Among some specimens of *Athoracophorus*, which I sent to Mr. Collinge as *A. bitentaculatus*, he found two differing from the rest in being much flatter, of dirty yellow ground-colour and with numerous black spots and dashes, and these he described as a new species, *Janella maculata*, giving a good account and figures of its anatomy. There is, however, not the least doubt but that the specimens I collected in the Forty Mile Bush, and of which I sent some to Mr. Collinge, consisted of *A. bitentaculatus* and *A. antipodarum*, at that time considered to be one species. Collinge, however, has shown that the two are quite distinct, and herein lies the great merit of his investigation. It is



I. II.

Athoracophorus bitentaculatus (Quoy & Gaim.).

I. Central tooth of radula. II. Sixth lateral tooth of radula. Both × 720.

evident that the specimens referred by him to *Janella maculata* are in fact *Athoracophorus bitentaculatus* (Quoy & Gaim.). The authors distinctly mention[1] that their species has brown spots: "La couleur de ce mollusque est d'un jaunâtre sale tacheté de brun clair."

I have dissected a number of what I consider to be typical *A. bitentaculatus*, and found them to agree with Collinge's new species.

The mantle-area is not defined, and is bordered, in front only, by a lateral groove, which runs down to the anal orifice; sometimes a fine line is found outside the pulmonary orifice parallel to the median dorsal groove, but there is no posterior limitation. In front of the pulmonary orifice is a small triangular area of lighter colour, with the renal orifice, in the median dorsal groove; this was taken for the anal opening by Knight, and for a mucous pore by Captain Hutton. The outflow and distribution of the renal secretion over the whole back of the slug were well described by Knight.[2]

[1] Voy. Astrolabe, Zool. vol. ii, p. 148.
[2] Trans. Linn. Soc., vol. xxii. p. 381.

The exact dimensions of a medium-sized spirit specimen are: —

1. Length over back from head to tip of tail, 33 mm.
2. Length of sole, 31 mm.
3. Width of back, 10 mm.
4. Breadth of sole, 3·5 mm.
5. Breadth of groove between sole and back, 2·5 mm.
6. Distance of anus from right tentacle, 6 mm.
7. Distance of anus from pulmonary orifice, 5 mm.
8. Distance of pulmonary orifice from head, 8 mm.

Median dorsal groove continued to the head. Anal opening close to foot margin. Genital opening close behind the right tentacle. Young specimens found near Auckland had only an oval space round the pulmonary orifice, coloured dirty yellow; the others lacked pigmentation, being semi-transparent, whilst some of the internal organs could easily be distinguished. In alcohol they became opaque like other specimens.

A. bitentaculatus is the most common species of the genus, and is more abundant in the North Island than in the South, where *A. papillatus* partially takes its place. It is said to occur also on the Chatham Islands, but I have not seen any specimens from that locality.

2. Athoracophorus antipodum (Gray, *em.*).

Janella antipodarum, Gray: Ann. Mag. Nat. Hist., vol. xii (1853), p. 414; and Proc. Zool. Soc., 1853, p. 112.
A. bitentaculatus, *auct.*, *non* Quoy & Gaimard.

The back is more rounded than in *A. bitentaculatus*, the colour brighter, and spots or dashes of brown or black are entirely absent. Its generative system was described and figured by Collinge[1] under the name of *Janella bitentaculata*, showing that *Athoracophorus antipodarum* is really distinct.

Gray does not give any special description of the species, but bases on it the diagnosis of his genus *Janella*. Cockerell, on examining the type-specimen in the British Museum, made it a *form* of *A. bitentaculatus*, saying "the variety differs from the type in being without spots."[2] This evidence shows that Collinge's *Janella bitentaculata* is really *Athoracophorus antipodarum*, and that his *Janella maculata* must be *Athoracophorus bitentaculatus*. There is only one other species of the section *Athoracophorus*, *A. dubius*, which has the same colour-markings as *A. bitentaculatus*. It differs from the latter, however, in several points, as will be shown further on.

A. antipodarum is distinguished from *A. bitentaculatus* by the absence of darker spots, the more highly rounded back, the long

[1] Proc. Zool. Soc., 1894, pp. 528, 529.
[2] Proc. Zool. Soc., 1891, p. 217.

tube-like position of the free oviduct, the much shorter penis, sharply distinct from the *vas deferens* (Collinge). The dentition shows no difference of any importance. Gray mistook the anus for the orifice of the reproductive organs, a mistake already corrected by Captain Hutton and P. Fischer, and does not say where he considers the anus to be situated. The dimensions and the openings of the different organs are almost the same as in *A. bitentaculatus*.

This species is rather rare, and I have not seen it from any other locality than the Forty Mile Bush, North Island, and Capleston, South Island.

3. Athoracophorus dubius (Cockerell).

Neojanella dubia, Cockerell: Proc. Zool. Soc., 1891, p. 217.
A. bitentaculatus, Suter, *non* Quoy & Gaimard.

The genus *Neojanella* was founded by Cockerell on the absence of a mantle-area and dorsal grooves. The former condition is common to the two species already mentioned, whilst the absence of dorsal grooves in a single spirit specimen is no proof that they are also absent in others. Heynemann has already pointed out[1] that the visibility of the dorsal grooves in Athoracophoridæ is dependent on the degree of contraction of the epidermis. I have many times had reason to confirm Heynemann's statement; it entirely depends on the mode of preservation whether the grooves will be very distinct or the reverse.

The specimen in the British Museum forming Cockerell's type is from the south side of Cook Strait, exact locality not stated. Judging from the description published by Cockerell, I took his *Neojanella dubia* to be only a large specimen of *Athoracophorus bitentaculatus*.[2] I have, however, been able to procure specimens of what I take to be his species from Pelorus Valley, also south side of Cook Strait, and the following data will help to show that it is distinct from *A. bitentaculatus* and a valid species.

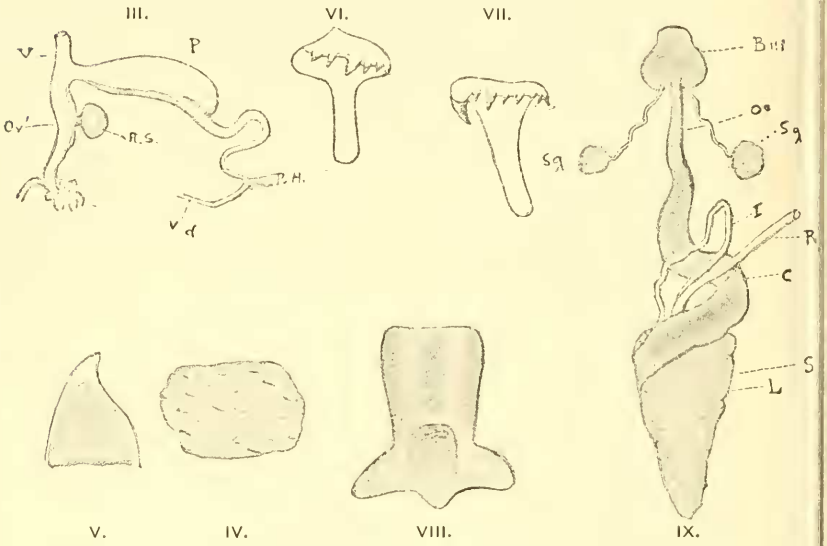
The colour-markings are the same as in *A. bitentaculatus*, usually with two darker bands on each side of the back; but the body is more elongate and more highly rounded, the dorsal grooves are finer; a black ring round the respiratory orifice is not always present; the median dorsal groove extends to the head. The movements of the animal are much brisker than in any other species I have seen, and when fully extended the body seems to be almost cylindrical. In specimens I preserved in alcohol, and in formalin, the dorsal grooves are always visible, as well as the fine granulation. What Cockerell took for the genital orifice is the anus. The openings of the different organs are in the same positions as in the two foregoing species. My specimens are not so large as the one described by Cockerell, which has a length (in spirit) of 53 and breadth of 11 mm. It very much depends on the locality whether our native slugs attain a large size or not, a fact I have often

[1] Jahrbuch Deutsch. malak. Ges., 1874, p. 196.
[2] Trans. New Zealand Inst., vol. xxvi, p. 125, etc.

had the opportunity of observing: the season also exercises some influence. My specimens were collected during winter and in the early spring. One living specimen measured 35 mm. in length by 5 mm. in breadth.

The dimensions of a good-sized spirit specimen are :—

1. Length over back from head to tip of tail, 33 mm.
2. Length of sole, 31 mm.
3. Width of back, 15 mm.
4. Breadth of sole, 5 mm.
5. Breadth of groove between sole and back, 2·5 mm.
6. Distance of anus from right tentacle, 6·5 mm.
7. Distance of anus from pulmonary orifice, 5 mm.
8. Distance of pulmonary orifice from head, 11 mm.



Athoracophorus dubius (Ckll.).

III. Anterior portion of genitalia: magnified. IV. Internal wall of penis, showing papillæ: magnified. V. Papillæ of penis wall: greatly magnified. VI. Central tooth of radula, × 720. VII. Sixth tooth of radula, × 720. VIII. Jaw, × 15. IX. Digestive system, enlarged.

LETTERING OF THE FIGURES.

alb.gl.	albumen gland.	v.d.	vas deferens.
h.d.	hermaphrodite duct.	B.m.	buccal mass.
h.gl.	hermaphrodite gland.	s.g.	salivary glands.
ov.	oviduct.	œ.	œsophagus.
ov'.	free oviduct.	c.	crop.
pr.	prostate.	St.	position of stomach.
p.	penis.	L.	liver.
r.m.	retractor muscle.	I.	intestine.
r.s.	receptaculum seminis.	R.	rectum.
v.	vestibule.		

The reproductive organs are distinguished from those of the two foregoing species as follows:—The penis (Fig. III) is about as long as in *A. bitentaculata*; its anterior portion is rather wide, but at about the middle it suddenly contracts, the slender second half being convolute with the retractor muscle. The size of the hermaphrodite gland, which is about twice that of those in the other two species, is especially noteworthy. The interior wall of the penis is covered with thorn-shaped papillæ (Figs. IV, V), very much like those described and figured by Bergh from *Triboniophorus Schuettei*.[1] I found similar papillæ present in the penis of *Athoracophorus bitentaculatus*.

Radula.—The rhachidian tooth (Fig. VI) is unsymmetrical, pointed in front, with six, sometimes seven, cusps, of which the median is the largest. The lateral teeth (Fig. VII) have eight cusps, the inner one being the largest. There is a considerable difference between the dentition of this species and that of *A. bitentaculatus*, the figures of two teeth (Figs. I, II) being given here for comparison. The jaw (Fig. VIII) is much the same as in the two species already enumerated, and there seems to be no chance of relying on it as a means for distinguishing the species, as often may be done in *Succinea*.

The digestive system (Fig. IX) does not differ much from that of the two other species. The crop is wide and long, extending to the liver, with no trace of a diverticulum; the stomach lies between the folds of the liver and the intestine, and forms a long anterior loop, returning to the liver, whence the rectum emerges.

Hab.—Pelorus Valley, Marlborough, South Island.

Sect. II. PSEUDANEITEA, Cockerell.

Cockerell, Proc. Zool. Soc., 1891, p. 217.

"Small slugs of New Zealand and the Auckland Is., resembling *Athoracophorus*, but showing a decided tendency towards the formation of a mantle-area like that of *Aneitea*. The *Janella papillata* of Hutton may be taken as the type."—*Cockerell*.

These slugs are not always small. Back usually finely granulate with larger raised tubercles or papillæ between the oblique grooves. Mantle-area distinct, triangular or quandrangular, enclosing the respiratory orifice. Anus below the latter and near the foot margin.

4. ATHORACOPHORUS PAPILLATUS (Hutton).

Janella papillata, Hutton: Trans. New Zealand Inst., vol. xi (1879), p. 332.

Athoracophorus verrucosus, Mts.: Simroth, Nova Acta Acad. Cæs. Leop. Carol., Bd. liv, p. 77, pl. iv, figs. 11–14.

For further references see Journ. de Conch., vol. xli, p. 235.

After carefully comparing Dr. Simroth's description and figures with my specimens, I am convinced that *A. verrucosus* is identical with

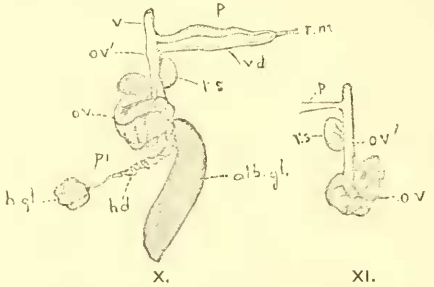
[1] Verhand. k. k. zool. bot. Ges. Wien, Bd. xx (1870), p. 853, pl. xiii, figs. 2–9.

A. papillatus. By way of addition to Simroth's description it may be mentioned that the colour of the back is yellowish-olive without spots; the sole being of a light-yellowish colour, and that fine granules cover the whole of the back, while in each lateral area there are from one to three larger papillæ of the same colour. The median dorsal groove extends to the head. The mantle-area is darker, mostly triangular, with the respiratory orifice nearly central. There is no area for the renal orifice, which is situated in the anterior left angle. The size of this species varies according to the locality. From the North Island I have seen only small specimens, but on the South Island large specimens occur.

The dimensions of a large spirit specimen are:—

1. Length over back from head to tip of tail, 60 mm.
2. Length of sole, 55 mm.
3. Width of back, 23 mm.
4. Breadth of sole, 10 mm.
5. Breadth of groove between sole and back, 4 mm.
6. Distance of anus from right tentacle, 10 mm.
7. Distance of anus from pulmonary orifice, 8 mm.
8. Distance of pulmonary orifice from head, 15 mm.

The reproductive organs (Figs. X, XI) agree with Dr. Simroth's description and figure of *A. verrucosus.* I dissected five specimens, and these organs were alike in all. The interior wall of the penis is densely beset with conical papillæ.



Athoracophorus papillatus (Hutton).

X. Genitalia: nat. size. XI. Anterior portion: magnified.
[For lettering, see ante, p. 250.]

The digestive system is normal, the crop very large, without diverticulum, the anterior loop of the intestine extending as far as the œsophagus.

Simroth concluded from the contents of the crop that these animals fed on ferns.[1] In a short note[2] I expressed doubts as to the correctness of this suggestion. I have had specimens of *Athoracophorus* in

[1] t.c., p. 80. [2] Journ. de Conch., vol. xl, p. 255.

captivity several times, but they would never touch a fern. The favourite hiding-place of Athoracophoridæ in New Zealand is beneath and within rotten logs and in the leaf-sheaths of *Phormium*, at the base of which plant there is always a large amount of moist, decaying vegetable matter. Examining the contents of the crop of *A. papillatus* found under a rotten log, I found it to consist of a pulp of the rotten wood. I never saw these molluscs feeding, since they are nocturnal, but I do not doubt that the majority of these slugs live on decaying vegetable matter, with which fungi, etc., are always largely mixed.

Hab.—North Island: Forty Mile Bush, small specimens only. South Island: Dunedin, Ashburton, Riccarton Bush, Pelorus Valley. Chatham Islands. Auckland Islands (Krone).

Var. *nigricans*, Martens, 1889.

Simroth, Nova Acta, etc., Bd. liv, p. 77.

This variety seems to be very rare. The original locality is Auckland Islands, but I have specimens from Dunedin and Pelorus Valley, South Island.

Var. *fasciata*, Von Martens, 1889, *em.* (*fuscata*).

Simroth, t.c., p. 79.

This is a more common form, which, however, I have not seen from the North Island. The arrangement of the dark-brown or black spots on the back is very variable, but usually they form three bands. It is sometimes as large as the typical form, but generally smaller.

Hab.—Auckland Islands; South Island; Dunedin; Hooker Valley; Pelorus Valley.

5. Athoracophorus Simrothi, Suter.

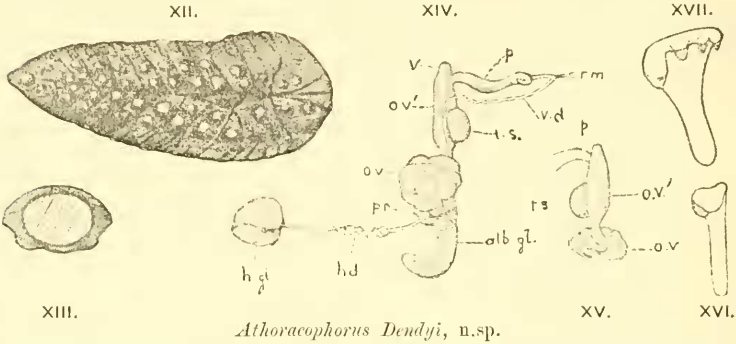
Athoracophorus Simrothi, Suter: Proc. Malac. Soc. London, Vol. ii (1896), p. 34, pl. iv, figs. 3, 4.

I have been unable to procure any more specimens of this interesting slug, and hence cannot add anything by way of supplement to my first communication.

6. Athoracophorus Dendyi, n.sp.

Body (Figs. XII, XIII) broadly elongate, anterior part very broad, narrowing gradually towards the tail. Back flatly rounded, with median and lateral grooves deep and conspicuous, median groove extending to the head, lateral grooves with one or two additional grooves near the margin. Colour dark-grey, darker along the middle. The whole of the back minutely granulate, between the oblique grooves one or two large raised round tubercles of much lighter colour, forming a single row on each side from the mantle-area to the head, double from the mantle-area to a short distance from the tail. Mantle-area triangular, sometimes quadrangular, granulose; the pulmonary orifice

in the middle near the right side, renal opening in the anterior angle, both orifices of a lighter colour. Anus below and a little in front of the respiratory orifice, near the foot margin. Foot with lateral grooves of yellowish-white colour; sole broad, smooth, with a lighter median



Athoracophorus Dendyi, n.sp.

XII. The animal; spirit specimen: nat. size. XIII. Transverse section of body. XIV. Genitalia: nat. size. XV. Genitalia, anterior portion magnified. XVI. Central tooth of radula, × 720. XVII. Sixth lateral tooth of radula, × 720.

[For lettering, see ante, p. 250.]

band. Distinct grooves between sole and back, showing distinctly the continuance of the dorsal oblique grooves. A thread-like line runs the whole length between sole and lateral groove. (Spirit specimen.)

The dimensions of a good-sized example are :—

1. Length over back from head to tail, 50 mm.
2. Length of sole, 40 mm.
3. Width of back, 23 mm.
4. Breadth of sole, 11 mm.
5. Breadth of groove between sole and back, 4 mm.
6. Distance of anus from right tentacle, 12 mm.
7. Distance of anus from pulmonary orifice, 9 mm.
8. Distance of anus from foot margin, 2·5 mm.
9. Distance of pulmonary orifice from head, 18 mm.

The reproductive organs (Figs. XIV, XV), which open close behind the right tentacle, are very much on the same plan as those of *A. papillatus*, but the following characters may be considered as of specific distinction. The free and rather large cylindrical oviduct is greatly dilated, and has the receptaculum seminis inserted at its posterior part. The penis is about the same shape as in *A. papillatus*, but somewhat longer and distally convolute. The hermaphrodite gland is larger and its duct longer than in *A. papillatus*. The interior wall of the penis is densely covered with oval papillæ, which sometimes terminate in a small sharp point.

The digestive system does not show any marked difference from that of *A. papillatus*; there is no diverticulum on the crop, and the jaw is

almost the same. The teeth of the radula (Figs. XVI, XVII), however, are very different. The rhachidian tooth is very slender, with a small irregularly-shaped cusp, bearing a single blunt denticle, usually on the left side, whilst the lateral teeth have a long and stout inner denticle and three, smaller, outer ones.

I have much pleasure in associating with this species the name of its discoverer, Dr. Arthur Dendy, Professor of Biology in the Canterbury College, University of New Zealand.

Type in my collection.

Hab.—Springburn, Mt. Somers; South Island (Dr. Dendy).

Sect. III. KONOPHORA, Hutton.

Hutton, Trans. New Zealand Inst., vol. xi (1879), p. 332.

Like *Janella*, but the eye-peduncles short and conical (Hutton). Back of body smooth, or faintly granulose. In spirit specimens the lateral grooves on the foot are present, but not very conspicuous, and there is no thread-like line between groove and sole. Mantle-area distinct, triangular, sometimes quadrangular. The median dorsal groove not always extending to the head. Renal opening a short distance in front of the mantle-area. Anus below the pulmonary orifice, near the foot margin.

7. ATHORACOPHORUS MARMOREUS (Hutton).

Konophora marmorea, Hutton: Trans. New Zealand Inst., vol. xi (1879), p. 332; vol. xiv, p. 158, pl. v, figs. 1–9.

A full description of this species and its anatomy has been given by Captain Hutton. The rhachidian tooth of the radula is very distinct, somewhat approaching that of *A. papillatus* in the emarginate anterior end, but there is no central denticle. The situation of the renal opening *in front of the mantle-area* is not met with in any other species, and is correctly reproduced in the figure given by Captain Hutton.[1]

This species attains a rather large size. The dorsal grooves in spirit specimens are sometimes very indistinct, and the back quite smooth.

The dimensions of a rather small specimen are:—

1. Length over back from head to tip of tail, 55 mm.
2. Length of sole, 45 mm.
3. Width of back, 21 mm.
4. Breadth of sole, 8 mm.
5. Breadth of groove between sole and back, 3 mm.
6. Distance of anus from right tentacle, 8 mm.
7. Distance of anus from pulmonary orifice, 9 mm.
8. Distance of anus from foot margin, 2·5 mm.
9. Distance of pulmonary orifice from head, 16 mm.

The genital orifice is close behind the right tentacle.

[1] t.c., pl. v, fig. 1*e* (mucous pore).

Hab.—South Island: Dunedin; Greymouth; Pelorus Valley.

This is one of our rare species.

Cockerell's *A. marmoreus*, forma nov., from Dunedin,[1] is undoubtedly *A. papillatus* var. *fasciata*. "Depressed raised tubercles" are not met with in *Konophora*.

Subgen. Amphikonophora, n. subg.

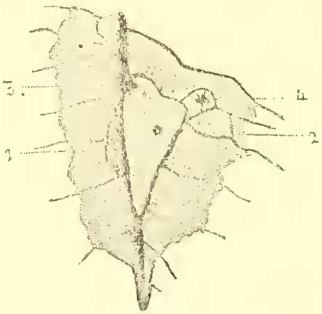
Large slugs with well-marked dorsal grooves. Mantle-area distinct, triangular, with the renal opening inside its anterior angle and the pulmonary orifice subcentral, nearer the right side. *Anus close to the outer angle of mantle-area.* The whole back finely granulate.

This is no doubt the most interesting group of *Athoracophorus*. It is unique in the situation of the anus close to the mantle-area, approaching thus the genus *Aneitea*, from which, however, it is distinct, especially in the absence of a diverticulum on the crop, the presence of a renal duct, the form of the teeth of the radula, etc.

8. Athoracophorus marmoratus, Simroth.

Athoracophorus marmoratus (Mts. MS.), Simroth: Nova Acta Acad. Cæs. Leop. Carol., Bd. liv (1889), p. 71, pl. iv, figs. 3–10.
A. marmoreus, Suter, *non* Hutton.

It is not very long since I obtained a specimen of this rare slug, which agrees perfectly with the description and figures published by Dr. Simroth. In Fig. XVIII the situation of the anus close to the



XVIII.

Athoracophorus marmoratus, Simroth.

XVIII. Portion of back with mantle-area: enlarged.

1. Mantle-area.
2. Pulmonary orifice.
3. Renal orifice.
4. Anus.

mantle-area, so characteristic of the species, is illustrated. Dr. Simroth's specimen was a very small one, 20 mm., but it may well be that these slugs do not attain a much larger size on the Auckland Islands. The

[1] Proc. Zool. Soc., 1891, p. 217.

specimen in my collection is 90 mm. long, foot 10 mm. broad, and was found on a birch-tree near Collingwood. It is thus evident that this species, in a genial, moist climate, attains to the largest size of all our native slugs.

Hab.—Auckland Islands (Krone); Collingwood, South Island.

Conclusion.—The geographical distribution of the species is not without interest. The North Island has only small, not much differentiated forms—*A. bitentaculatus*, *A. antipodarum*, and small forms of *A. papillatus*; whilst in the South Island, large, more differentiated, and generally darker-coloured species occur. Of the eight species all are found on the South Island, but the larger forms prevail, especially *A. papillatus*. Two species occur as far south as the Auckland Islands. We know nothing of any native slugs and very little about the other land mollusca from Stewart Island. There is no reason why *Athoracophorus* should not exist on this latter island, and it is even probable that new species may be found on it some day.

Like the unfortunately extinct Moa, *Athoracophorus* attains its greatest development and differentiation on the South Island. The comparison may seem somewhat peculiar, but it is quite in accordance with the facts.

The genus *Athoracophorus* is restricted to New Zealand, including the Chatham and Auckland Islands. The two other genera of the family are found: *Aneitea*, Gray, in East to North Australia, New Caledonia, and New Hebrides; ?*Aneitella*, Cockerell, on Wild Island, Admiralty Archipelago. The occurrence of members of the family in New Guinea is to my knowledge not quite certain yet, but they seem to be absent from the Kermadec, Norfolk, and Lord Howe Islands.

Mr. C. Hedley included *Hyalimax*, H. & A. Ad., in the family,[1] but according to Dr. Simroth this genus is much nearer the Succineidæ and has nothing whatever to do with the Athoracophoridæ.

[1] Trans. New Zealand Inst., vol. xxv, p. 161.